

Atlantic Richfield Company Remediation Management April 26, 2017 Proposed Closure Plan Strategy

Agenda and Discussion Topics



Morning Session

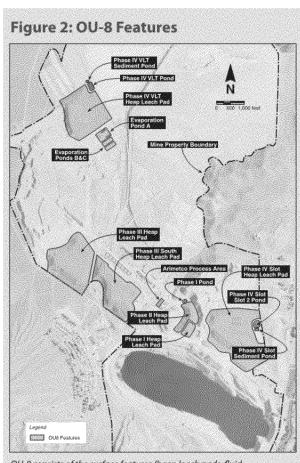
- Current OU 8 Proposed Plan Re-Cap
 - Closure Refresher
 - Draindown Projections
- Closure Borrow Sources
- Closure Management Unit Development
- Proposed Refinements to Closure Plan Strategy
- RIFS Progression
- Process Sequencing

Afternoon Session

- Alternative OU 8 Closure Design Concepts and Suggested Refinements to the Proposed Plan
- Design Concepts

The OU 8 Proposed Plan





OU-8 consists of the surface features (heap leach pads, fluid management ponds and conveyance channels), and shallow zone soils in the process areas associated with the former Arimetco Operations.

The Problem...

- Acidic draindown fluids containing elevated total dissolved salts (TDS) and metals.
- The fluid management ponds are expected to reach capacity in two to four years.
- O&M is expensive with aged infrastructure.
- Repeatedly constructing new evaporation ponds is not a sustainable, fiscally responsible longterm remedy.

The OU 8 Proposed Plan



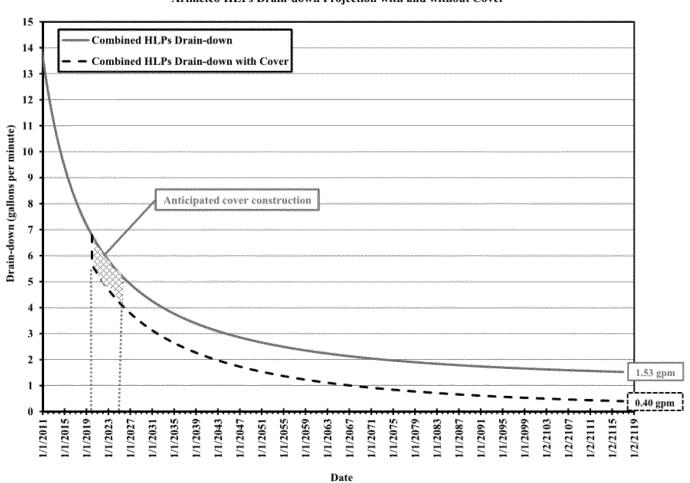
The Solution ... a quick refresher

- 1. Regrading and capping all surfaces of the HLPs, including side slopes, with a soil cap, to further minimize precipitation infiltration
- 2. Closure and conversion of ponds to e-cells for ponds not needed to manage residual draindown fluids and precipitates
- 3. Installation of stormwater routing and storage features including piping, open channels, and stormwater basins
- 4. Continuation of active management and evaporation of fluids
- Storm Water Management develop peripheral stormwater management system to be integrated into the site wide stormwater management system – stormwater management will provide separation from draindown fluid management

Potential Reduction in OU 8 HLP Draindown with and without Soil Covers

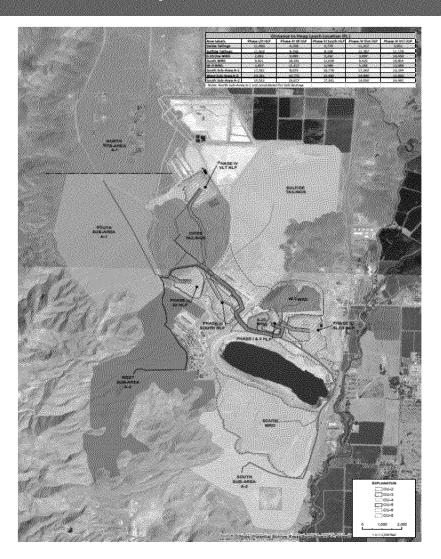


Arimetco HLPs Drain-down Projection with and without Cover



Potential Opportunity to Expand Closure Efficiency in OU 8 Proposed Plan Borrow Sources

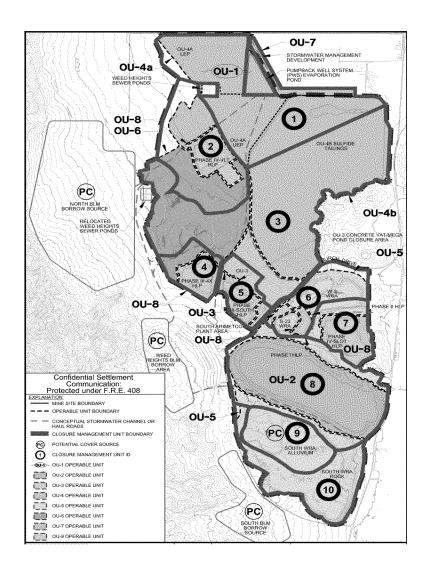




- Conceptual Borrow Sources include materials from OU 4b, OU 5, OU 6 and offsite borrow areas adjacent to mine
- Borrow areas would require reclamation at conclusion of OU 8 Implementation as part of the closure
- Presents an opportunity to integrate and expand the closure to include the borrow materials and areas along with OU 8 closure
- Additional expansion opportunity to efficiently close the entire site in a continuous RA effort with the potential to condense the schedule

Conceptual Site Closure Management Units (CMUs) Organization of OUs and CMUs





Closure Management Unit (CMU)	Operable Unit (OU)
CMU 1	OU 1, OU 4 (4a and 4b), OU 6, OU 7
CMU 2	OU 4a, OU 6, OU 8 (Phase IV VLT)
CMU 3	OU 3, 4a (Calcine ditch), 4b, OU 6
CMU 4	OU 6, OU 8 (Phase III-4X)
CMU 5	OU 3, OU 8 (Phase III-South)
CMU 6	OU 5, OU 8 (Phase I/II HLP and Plant)
CMU 7	OU 5, OU 8 (Phase IV Slot HLP)
CMU 8	OU 2
CMU 9	OU 5 (Alluvium)
CMU 10	OU 5 (Rock)

Summary of CMU Conceptual Benefits and Approach



Benefits

- Feasibility of Construction
- Efficiency of Design, Material use and Construction Implementation
- Improved RA Implementation Schedule
- Cover and Fill Flexibility
- Improved Safety
- Long-Term Effectiveness and Sustainability

Approach

- Flexible closure units not constrained by OU boundaries
- Redefine Operating Units by waste/material type as Closure Management Units
 - materials and construction are coordinated to attain efficient closure objectives
- Efficiency and Worker Safety benefit from an uninterrupted construction implementation phase

Suggested Refinements to Proposed Plan



Coordinated Response

 Develop coordinated closure plan with Closure Management Units (CMUs) to coordinate closure efforts with adjacent OUs with FS completion.

Construction Sequencing

OU 8 discontinuity across the site requires closure phasing in concert with other OU closure for efficiency and less duplication of effort.

Regrading and Expanded Footprint

 Steep and unstable slopes constricted by HLP footprints, require expanded footprint for constructible closure slopes

Fluid Management and Pond Construction

 Due to ongoing fluid management that will likely have to continue for many years, closing of certain ponds, conversion to e-cells, and/or creation of new, permanent ponds may be required

Source(s) of Fluid Generation

 Significant residual process fluids in the HLPs will remain within the HLPs, even after regrading and covering, for some extended period of time. This residual fluid will require monitoring and long-term O&M.

Suggested Refinements to Proposed Plan (Cont.)



Estimated Costs

 Costs developed in the Conceptual Closure Plan and presented in the Proposed Plan were preliminary estimates, and underestimate the actual costs of closure, particularly for the larger, holistic, site-wide closure that incorporates portions of adjacent OUs with OU 8 closure

Stormwater Management

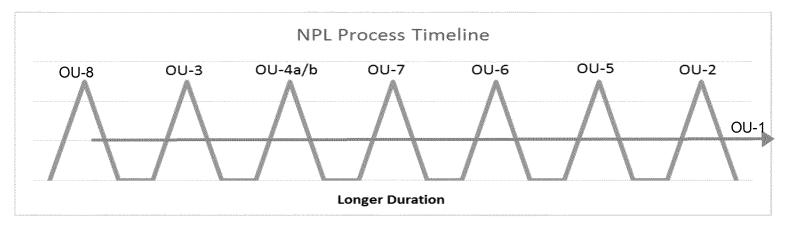
 Preliminary engineering design called for specific stormwater management features and made recommendations for connections to site-wide stormwater systems. This approach will be enhanced even further during final engineering design, and will benefit from the proposed CMU closure strategy

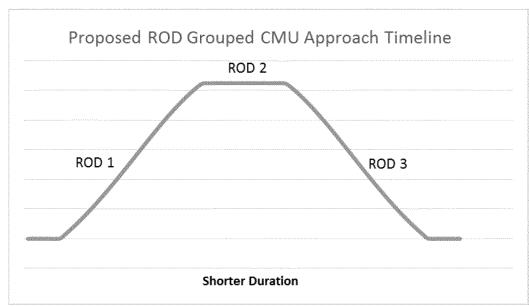
Soil Caps

 During engineering design phase, HLP cover analyses and other design considerations will guide final decisions on cover materials, including the types of soil covers on some of the HLPs

Potential Site-wide Closure Progression Efficiency



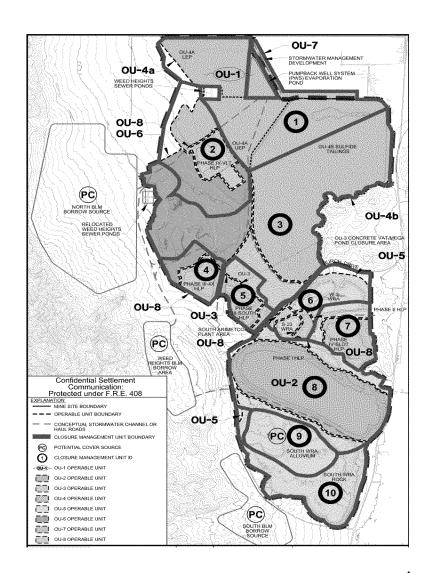




- Organize closure to optimize construction effort into Closure Management Units (CMU)
- Group CMUs into three RODs to optimize and streamline site wide RA efforts

Conceptual Site Closure Management Unit (CMU) Cross Walk Table for CMUs and OUs

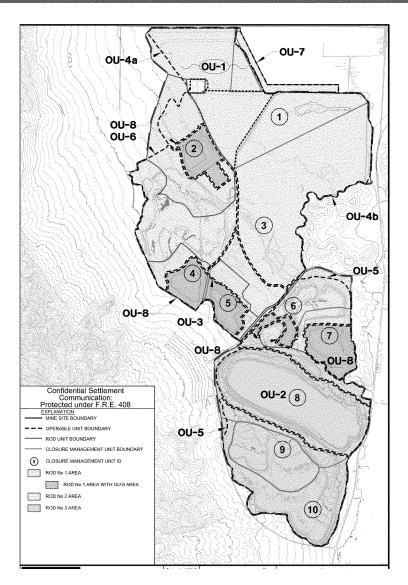




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CMU 1	OU 1, OU 4 (4a and 4b), OU 6, OU 7
CMU 2	OU 4a, OU 6, OU 8 (Phase IV VLT)
CMU 3	OU 3, 4a (Calcine ditch), 4b, OU 6
CMU 4	OU 6, OU 8 (Phase III-4X)
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CMU 6	OU 5, OU 8 (Phase I/II HLP and Plant)
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CMU 8	OU 2
CMU 9	OU 5 (Alluvium)
CMU 10	OU 5 (Rock)

Conceptual Grouping of CMUs into RODS





Record of Decision (ROD)	Operating Unit (OU)	Closure Management Unit (CMU)
ROD 1	OU 4a, OU 6, OU 8	CMU 2
	OU 6, OU 8	CMU 4
	OU 3, OU 8	CMU 5
	OU 5, OU 8	CMU 6
	OU 5, OU 8	CMU 7
ROD 2	OU1, OU 4 (4a and 4b), OU 6 OU7	CMU 1
	OU 3, 4a (Calcine ditch), 4b, OU 6	CMU 3
ROD 3	OU 2	CMU 8
	OU 5 (Alluvium)	CMU 9
	OU 5 (Rock)	CMU 10

Remedial Investigation Progression



- RI work will be completed at the OU level going forward
- □ RIs will be completed for each OU at the site except OU 8 (already completed)
- □ RI work is nearly complete for OUs 1, 3, 4a, and 7.
- □ Peripheral areas of OUs 3, 5, 6 involved in ROD1 design will be characterized as part of predesign
 - Characterization data will be fed back to the RI evaluation.
 - Additional RIFS work is not expected to be required for the portions of OUs 3, 5 and 6 that will be addressed by ROD 1 RD/RA.
- One RI report is anticipated to encompass OUs 2, 4b, 5 and 6.
 - Focused additional characterization is anticipated for these large homogeneous features.

Feasibility Study Progression



- □ ARC will aggregate OUs together at the FS stage (see ROD-CMU-OU Crosswalk)
- □ ROD 1
 - Areas of OUs (adjacent to OU 8) to be included in ROD 1 will be investigated in predesign phase and addressed by Action Memo
 - Areas of OUs not included in ROD 1 will proceed through ROD 2 RIFS process
- ROD 2 FS presumed to include CMUs 1, 3, and groundwater, and portions of OUs 1, 3, 4a, 4b, 6 and 7 in the northern portion of the site
 - The FS for groundwater will need to assess alternatives for stability, exposure, and impracticability of capture/ treatment
 - ARC will prepare an FS under the interim AOC
- ROD 3 FS contemplates CMUs 8, 9 and 10 and portions of 2 and 5 in the southern portion of the site
 - ARC will prepare this FS under the interim AOC

Conceptual "OU 8" Sequencing



Task	Target Completion Date
Initiate "OU 8" Remedial Design	2017
ROD1 "OU 8" Phase Implementation	2018
Initiate Site-Wide RI (including Risk Assessment) and Pre-Design Data Gaps Study	2018
CMU 4 and 5 Ponds Constructed	2019
Complete Site-Wide RI including Risk Assessment	2020
Feasibility Study for Groundwater and Northern OUs (OU1, OU 3, OU 4, OU 6, and OU 7)	2021
Feasibility Study for Pit Lake and Southern OUs (OU 2 and OU 5)	2021
ROD2 for Groundwater and Northern OUs (OU 1, OU 3, OU 4, OU 6, and OU 7)	2023
ROD3 for Pit Lake and Southern OUs (OU 2 and OU 5)	2023
ROD1 CMUs 4, 5, 6, and 7 Completed	2024
OU 8 Remedial Action Completion and O&M Transfer Complete	2027

Questions and Discussion

